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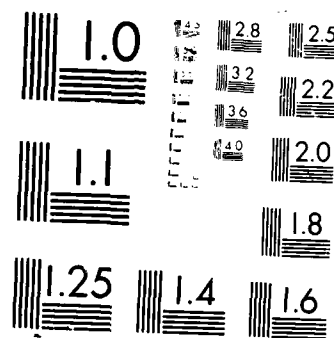
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DEVELOPMENT OF SOVIET
STATE ERGONOMIC STANDARDS (GOST)

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Prepared for

Foreign Science and Technology Center
U. S. Army Human Engineering Laboratory

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by

Noemi S. Galton and Bernard O. Williams, Ph.D.
The Report Store
Suite 602
910 Massachusetts Street
Lawrence, Kansas 66044

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DEVELOPMENT OF SOVIET STATE ERGONOMIC STANDARDS (GOST)

Standards System

The current state system of standardization in the Soviet Union was mandated by Resolution No. 16 of the USSR Council of Ministers "On Improving the Work on Standardization in the Country," dated 11 January 1965. The Committee of the Council of Ministers for Standards, Measures and Metering Devices was charged with developing the system of standardization.

State standards carry the following caveats: "Official Publication" and "Reproduction Prohibited." Most standards carry the notation "Failure to Comply with the Standard is an Offense under the Law." However, a certain number of standards are advisory rather than mandatory ("rekomentatel'nye GOSTy"). Preliminary indications are that many of the ergonomic standards are advisory standards.

The operation of state standards is outlined in class 1 standards "State System of Standardization" (see table 1). The abbreviation "GSS" is customarily used to designate this set of standards (from the Russian Gosudarstvennaia Sistema Standartizatsii - State Standardization System). First standards of this class were adopted in 1968 and took effect on 1 January 1970.

As of 1 January 1986, 22 GSS standards were in effect, designated as GOST 1.0-68 through GOST 1.26-77. The last two digits following the hyphen represent the year of adoption throughout the entire collection of state standards. (The GSS system has no current standards numbered 1.4, 1.10, 1.12, 1.14, or 1.24.)

Examples of GSS standards are:

GOST 1.0-68 General considerations

GOST 1.1-68 Standardization Organs and Services

GOST 1.2-68 Procedures for Preparing and Adopting State Standards

GOST 1.0-68 establishes the basic concepts of the system including:

- definition of the notions "standardization," "normative-technical standardization document," "standard," "COMECON standard";
- main objectives and tasks of standardization;
- categories of standards and objects of standardization;
- types of standards;
- guidelines for planning standardization work,
- stages of standard development.

Development of standards occurs in six stages (as specified in chapter 6.1 of GOST 1.0-68)

- Stage 1 - organization of standard preparation and drawing up of the request for proposal (RFP);
- Stage 2 - development of a draft standard (first wording) and its distribution to reviewing institutions, i.e. producers and consumers of a product or products covered by the standard -- industrial, agricultural, transportation or military units;
- Stage 3 - processing of reviews and preparation of the final (second and, if need be, subsequent) wordings of the draft standard;
- Stage 4 - preparation, coordination and submission of the draft standard for adoption (coordination involves resolving the differences between interested parties indicated by their reviews sent to the preparing agency);
- Stage 5 - consideration of the draft standard, its adoption and registration;
- Stage 6 - publication of the standard.

GOST 1.2-68 sets up unified procedures for all branches and sectors of the Soviet economy regarding the development, review and coordination, adoption, formatting, registration and publication of state and sectoral standards.

GOST 1.20-69 governs state inspection and supervision by individual ministries of compliance with standards, as well as the implementation of standards, setting guidelines and deadlines for review and reconsideration of standards and subsequent revisions.

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Table 1. Soviet "Systems" (Classes) of State Standards

=====

-
- 1 - State System of Standardization (GSS).
 - 2 - Unified System of Design Documentation (ESKD).
 - 3 - Unified System of Technological Documentation (ESTD).
 - 4 - System of Product Quality Indicators (SPKP).
 - 6 - Unified Systems of Documentation (USD).
 - 7 - System of Information and Bibliographic Documentation (no abbreviation).
 - 8 - State System of Measurement Unification (GSI).
 - 9 - Unified System of Prevention of Corrosion and Aging of Materials and Products (ESZKS).
 - 11 - Applied Statistics (no abbreviation).
 - 12 - System of Occupational Safety Standards (SSBT).
 - 13 - Microfilming (no abbreviation).
 - 14 - Unified System of Technological Production Support (ESTPP).
 - 15 - Development and Start-up of Production (no abbreviation).
 - 16 - Control of Technological Processes (no abbreviation).
 - 17 - System of Standards on Environmental Protection and Improved Use of Natural Resources (no abbreviation).
 - 18 - Quantitative Methods of Optimizing the Parameters of Standardization Subjects (no abbreviation).
 - 19 - Unified System of Programming Documentation (ESPD).
 - 20 - Unified System of State Control of the Quality of Production (no abbreviation).
 - 21 - System of Design Documentation for Construction (SPDS).
 - 23 - Assurance of Product Resistance to Wear (no abbreviation).
 - 24 - Unified System of Standards for Automated Control Systems (no abbreviation).
 - 25 - Strength Calculations and Tests in Machine Building (no abbreviation).
 - 26 - Unified System of Standards for Instrument Engineering (ESSP).
 - 27 - System of Standards "Reliability of Equipment" (SSNT).
 - 28 - System of Technical Service and Repairs of Equipment (no abbreviation).
 - 29 - System of Standards for Ergonomic Requirements and Ergonomic Support (no abbreviation).
 - 30 - System of Standards for Ergonomics and Technical Esthetics (SSETE).
 - 31 - System of Standards for Technological Rigging (no abbreviation).
-

Source: Gosudarstvennye standarty SSSR. Ukazatel' 1986, Moscow, p. 8.

Notes: Abbreviations of Russian "system" (class) titles are quoted where officially designated.

The official Soviet list makes no mention of class 5, 10 and 22 standards.

Standardization Agencies

A. Issuing Agencies

GOST 1.1-68, "State System of Standardization. Organs and Services of Standardization." outlines the division of responsibilities among individual agencies and institutions and the jurisdiction of individual units.

Chapter 2 of GOST 1.1-68 identifies the State Committee of the USSR Council of Ministers for Standards (in short, "Gosstandart") as the national organ of state administration overseeing the standardization effort. The chapter sets forth the main tasks of the committee, the scope of its responsibilities, procedures for state-endorsed testing, etc.

Paragraph 2.1.5 of this standard specifies the organizations reporting to "Gosstandart" and entrusted with responsibilities for processing and evaluating draft standards. These are research institutes and their branches, design offices, and testing and experimental facilities. The same paragraph details the jurisdiction of individual units.

With minor exceptions, the exclusive authority to adopt standards is vested in "Gosstandart," regardless of the organizational affiliation of the unit developing the standard and submitting it for adoption. Compliance with the standards in effect is enforced by 244 territorial inspectorates of "Gosstandart." A minor but potentially important exception is made for the USSR Committee for Construction, or "Gosstroy." "Gosstroy" is authorized to adopt standards on its own, but only within its sphere of responsibility. Some human factors standards may fall within the jurisdiction of "Gosstroy."

B. Development and Testing Agencies

Standards are developed and submitted for evaluation to the research institutes of "Gosstandart" and for subsequent adoption to the committee by the so-called "leading" ("golovnye") and "basic" ("bazovye") organizations. Typically, these are research institutes and centers reporting to ministries responsible for particular economic sectors (say, the Ministry of Communications).

A great number of "leading" and "basic" organizations throughout the economy participate in developing standards. As of 1985, their numbers stood at 325 and 1,829 respectively. In addition, special units at enterprises and industrial associations are involved in similar activities (see Ekonomicheskaya gazeta, 1985, No. 23, p. 7). The responsibilities and procedures for "leading" and "basic" organizations are outlined in point 2.2 of GOST 1.1-68.

C. Ergonomics Organizations

Two major organizations are responsible for ergonomics and would draft and review human engineering standards. The Academy of Sciences Institute of Psychology in Moscow, headed by Boris Lomov is the lead organization for human factors research. VNIITE, All-Union Research Institute for Technical Aesthetics (alternately translated as All-Union Research Institute of Industrial Design) in Moscow coordinates applications of ergonomics in Soviet industries. Vladimir Munipov, Deputy Director of VNIITE, is in effect the coordinator of applications research. Munipov is also the principal coordinator for ergonomic research in all socialist countries.

The Academy of Sciences Institute of Psychology is divided into five departments:

- Theoretical and Experimental Psychology,
- Neurophysiological Problems of Psychology,
- Engineering Psychology and Psychology of Labor,
- Social Psychology, and
- Philosophical Problems of Psychology

The Department of Engineering Psychology and Psychology of Labor, headed by Valery Venda, is especially interested in automated systems, information display systems, multisensory information channels, mathematical modeling of human performance and methodologies of experimentation.

VNIITE has nine branches in various large cities. Each of the branches has a department or laboratory of ergonomics, working under a common plan with the methodological guidance of the head department in Moscow. The Department in Moscow deals with:

- theoretical and methodological issues
- visual processes in automatic control systems
- psychophysiological conditions of work
- predesign models of workplaces
- anthropometry
- methods for computerizing ergonomic investigations

Each of the branch offices has been assigned responsibility for particular basic ergonomic issues and specific applications areas.

The Ural branch performs physiological and hygienic studies, develops methods for product evaluations, and specializes in equipment for transportation and heavy industry.

The Khar'kov branch develops integral ergonomic criteria and studies operator performance in automated systems.

The Byelorussian office studies agricultural machines and ergonomic problems of microminiaturization.

The Leningrad office deals with machine tools, computer information presentation, and lighting effects on work.

The Armenian branch studies trucks and operator monitoring tasks in automated systems.

The Vilnius office is concerned with work posture.

The Far East office develops techniques for estimating human biases in work processes.

The Kiev office specializes in design, construction, and use of automatic control systems and information presentation. (The branches in Moscow and Khar'kov also work on these issues.)

Types of Standards.

GOST 1.0-68, point 3.1 classifies Soviet standards into the following categories:

- state standards of the USSR - GOST
- sectoral standards ("otraslevye standarty") - OST
- republican standards of union republics - RST
- standards of enterprises or their association - STP

GOST 1.0-68, point 4.2 divides standards for products from all four categories into the following types:

- technical specifications standards (general technical specifications);
- technical requirements standards (general technical requirements);
- standards for parameters and/or sizes;
- standards for types, main parameters and/or sizes;
- standards for design and sizes;
- standards for markings;
- standards for assortments;
- standards for acceptance procedures;
- standards for methods of control (testing, analysis, measurement);
- standards for rules on marking, packaging, transporting and storing;
- standards for rules on operation and maintenance;
- standards for typical technological processes.

Approximately 20% of Soviet standards have application in more than one industry and are grouped into numbered topical sets (in Soviet parlance, "interbranch systems of standards"). As of 1 January 1986, 28 sets were in existence, numbered 1-31 with 5, 10, & 22 missing, (see table 1).

Set 12 (Safety), and sets 29 and 30 (both ergonomics) are of special interest.

The vast majority of standards are unique to an industry and are not prefixed with an "interbranch system" number. The numerical identifier is simply a sequential number followed by the hyphen and two digit year identifier.

In the GOST index, all standards are divided into commodity groups designated by letters, e.g.:

group A "Mining, Minerals and Fossil Fuels" and

group L "Chemical Products and Rubber and Asbestos Goods."

The groups are divided into numbered subgroups, e.g. :

L00 Terms and Designations

L6 Rubber and Asbestos Groups

Within subgroups there are further subdivisions, e.g. L62 Tires.

Ergonomics standards with broad application are included in Group T58 "System of Standards on Environmental Protection and Improved Use of Natural Resources, Occupational Safety and Scientific Organization of Labor."

GOST Index Structure

The following description for using the Standards Index is translated from Gosudarstvennye standarty SSSR. Ukazatel' 1986, Moscow, pp. 6-7.

"For our Readers:

"The following should be kept in mind while using the index State Standards of the USSR 1986.

"All information in the index is given as of 1 January 1986. In 1986, the index State Standards of the USSR is published in four volumes.

"Volume 1. Chapter I - State Standards of the USSR (sections A-G)

"Volume 2. Chapter I - State Standards of the USSR (sections D-S)

"Volume 3. Chapter I - State Standards of the USSR (sections T-E)
Chapter II - COMECON Standards Directly Introduced as
State Standards of the USSR
Chapter III - Designations of COMECON Standards
Introduced in the Economy of the USSR
Chapter IV - Designations of State Standards Unified
Bilaterally between the USSR and Socialist Countries
Chapter V - Subject Indicator

"Volume 4.
Chapter VI - Designations of State Standards of the
USSR
Chapter VII - Designations of COMECON Standards
Directly Introduced as State Standards of the USSR

"All standards are attributed to chapters, classes and groups in accordance of the Classifier of the State Standards of the USSR.

"Along with USSR state standards, the index includes standards of the Council for Mutual Economic Assistance (ST SEV) which are used in the national economy of the USSR.

"Inside the groups, standards are located according to ascending numbers.

"During a search, if you are aware only of the designation of a document, its group can be found in chapters VI and VII of the index. The title of the document can be found in chapters I and II.

"The subject index includes titles of standardized topics indicating the group according to the Classifier of the State Standards of the USSR.

"If a state standard is superseded by a new one which takes effect after 1 January 1986, only the new standard is published in volumes 1,2 and 3. The entry indicates which document it supersedes or which part of the [old document] it replaces. In Chapter VI, designations are included for both the standard in effect and the one which has not yet taken effect.

"In the column 'Notes,' the date these standards respectively take effect and expire are indicated, e.g.,

5288-75 A12 until 01-01-87

5288-85 A12 from 01-01-87
until 01-01-92

"In the case of COMECON standards (ST SEV), the numerator in the column 'Notes' indicates the date the ST SEV takes effect for the sectors of the national economy of the USSR, whereas the denominator - the date it takes effect in contractual and legally binding relationships, e.g.,

01.01.87

4473-84 G00 -----

01.01.87

"In cases when a state standard in effect or some of its chapters entirely correspond to a COMECON standard, the ST SEV is applied in the Soviet national economy by introducing it into a GOST. If an ST SEV is introduced into a state standard of the USSR, the designation of the ST SEV is given under the designation of the GOST, e.g.,

20332-84 E00

(ST SEV 1125-78)

"In references to the GOST, the ST SEV is not quoted in its designation.

"One asterisk denotes the designation of a standard for which an amendment has been adopted. The number of the amendment and the number and year of publication of the data index in which the amendment was published are indicated in brackets in the column 'Notes', e.g.,

16878-71* D15 (1-I-85)

"Two asterisks denote standards which have been partially superseded or cancelled, e.g.,

7769-82** B83

"Three asterisks denote standards which have been given the designations of previously cancelled standards, e.g.,

1016-72*** N53"

Standards Application with the Military

With rare exception, all "civilian" industries of the Soviet Union contribute to both the "civilian" economy and the military sector. This is also the case with the "open," non-secret enterprises furnishing equipment, assemblies and materials to both civilian and military enterprises.

A special division of the State Committee for Standardization is charged with advocating the interests of the military in the process of standardization. The division ("General Technology Department") verifies whether consultations and coordination with the military organizations involved have been adequately comprehensive. The General Technology Department reviews standards prior to their adoption by the State Committee for Standardization (this was the procedure in the late 1970s; most likely, this is still the case).

At the time, standards coordinated with one or more military units were required to carry special designation when subsequently approved and published. Following the words "Official Publication" on the first page of the GOST, one or more asterisks appeared. The number of the asterisks corresponded to the number of military organizations (units, R & D facilities, industrial sectors, etc.) interested in a given standard.

It is impossible to tell from the asterisks which branch or service of the armed forces was involved, as the asterisks were the same for all of them. However, the subject matter of the standard in question offers clues (e.g. the Air Force or the Army are less likely to be particularly interested in "Main Power Plants of Seagoing Craft" than would be the Navy). Copies of standards currently in effect would have to be examined to ascertain that the "asterisk" feature is current and to make use of it in further research.

Anthony Cacioppo has noted that the head design engineer has complete decision power to follow or ignore GOST standards in the development of specifically military systems, but pertinent GOST standards are usually followed in military systems. (See Cacioppo's keynote address, Proceedings of the Human Factors Society, 1986.)

International Participation

A. ISO

A comparison with internationally established quality levels is required when draft standards for products are developed and reviewed. To this end, comparative tables of characteristics are compiled. Also, it is established which characteristics used internationally are absent from domestic drafts, and the other way around. As a rule, the preamble of a GOST states which ISO recommendation the GOST complies with, and, if compliance is partial, which part of the standard is involved.

B. COMECON

In the process of developing and reviewing a standard, compliance with the recommendations or standards of the COMECON is regarded much more seriously than compliance with ISO recommendations. As can be seen from the 1986 index of GOSTs, those of the latter which comply with COMECON standards have a dual designation, e.g. GOST 8249-84E (COMECON standard 1832-79). This designation indicates that a COMECON standard has been directly adopted as a national Soviet standard. At the same time, it ensures the ease of interpretation inside the country, for those who are used to referring to domestic standards.

The recent trend in the COMECON is towards the weakening of the joint standardization effort. There are even suggestions that "formal activities which abound in the fields . . . of technical cooperation and standardization will cease" (see Bulletin of the Association for Comparative Economic Studies, 1986, No. 3, p. 49). It remains to be seen how such new policies may influence the national system of standardization in the USSR.

C. Other.

In developing and reviewing draft standards, every effort is made to evaluate its level by comparing it to those achieved elsewhere in the world. For this purposes, technical level charts ("karty tekhnicheskogo urovnia") are compiled in which products, performance or methods are compared to international standards or national standards of other countries, as well as other available foreign sources (company catalogs etc).

Development and Use of Human Factors Engineering Standards

The following procedures for Ergonomic Standardization and Quality Assessment are translated from the joint CEMA ergonomics handbook: Ergonomika. Printsipy i rekomendatsii, USSR State Committee on Learning and Technical Methods, Moscow, 1983, pp. 174 - 176.

"5.1 STANDARDIZATION OF ERGONOMIC NORMS AND REQUIREMENTS

One of the efficient means for the control of the design of man-machine interaction systems and conditions for their operation is standardization. Four categories of ergonomic standards are distinguished.

- basic ones, which comprise the main human characteristics (anthropometric, sensory, motor etc.)
- functional ones, containing ergonomic requirements for technological means, processes, industrial products and systems,
- standards concerning physical, chemical and biological environmental factors to which men are exposed;
- standards comprising requirements for procedures and methods of ergonomic research.

"There is an active drive towards the establishment of systems of standard reference ergonomic data (data banks). A certain conception of standardization in ergonomics is taking shape, based on the idea that complex acquisition and the design of corresponding outer means and inner methods of human activity are impossible without the isolation of certain characteristics within the production process and within the conditions for its completion. Such an isolation demands standardization or unification. The question concerning what specifically should be standardized and for what purpose is being dealt with from the perspective of a comprehensive analysis of knowledge about humans, their activities, and the functioning of man-machine systems.

"Standardization in ergonomics is a new task, and a very delicate one, since it is directly tied to man and his activity. For this reason the capabilities of standardization are quite limited, especially in terms of its relationship to organization of activities. The tendency towards unification of work modes and methods and towards the subordination of human activity to strict and simple prescriptions harbors the serious danger of converting humans into machine appendixes. As a consequence all positive human capacities stemming from superior human qualities in comparison to a machine as an active subject of work go unrevealed.

"The uniform structure of psycho-physiological activities corresponds to the uniform outward means which are characterized

by unified ergonomic requirements and indicators. This is the object of branch standardization. Ergonomic requirements or indicators, reflecting the commonality of some elements of the psychophysiological structures of activities differing in format, are the objects of interbranch standardization. Depending on the goals and objectives, ergonomic standardization most often uses the methods of uniformization and of threshold parameters. The former method helps to analyze and to isolate elements within the activity or ergonomic requirements placed upon the product. These elements and requirements are common for the given class of systems and they have potential for multiple use. The following condition is necessary for this method: the common activities, general elements, indicators and requirements which should be fixed within the standard are to have optimal values on the chosen criterion, that is, are to represent a standard reference point. The use of the second method allows the determination of the value of the limits of the zone of optimal work conditions, kind of work and parameters of technical means of activity which allow for the most effective work.

"Ergonomic evaluation (assessment) of standards, which constitutes one of the ways to enhance their quality, is an important aspect of standardization work.

"The process of technical evaluation of standards has two stages: selection and verification.

Selection

The objective of selection is to elicit the object of ergonomic standardization. In order to do this it has to be determined whether

- operations in production are the object of standardization;
- these operations comprise movements requiring physical effort;
- these operations restrict movement (designed to be performed by tall, medium-height or short workers),
- there are requirements for the worker's sight, sense of touch or hearing;
- these operations communicate to the worker the meaning of symbols, colors, signs;
- the impact of physical, chemical, or biological factors of the production environment is taken into account;
- these operations were designed to be performed by left-handed or handicapped people.

An affirmative answer to any of these questions means that the object of standardization is in the realm of ergonomics and can undergo ergonomic analysis and verification.

"The basic form of selection is expert evaluation. In this process specialists express their views about separate ergonomic requirements contained in the standard and evaluate them.

Verification

"The objective of standards verification is to evaluate the compliance of the requirements they contain with the ergonomic requirements. The ergonomic requirements are evaluated for the individual components of systems and products.

The following are verification objects:

- working space
- control organs
- forms of reflecting information
- production environment

Evaluation of the working space involves:

- the structure of the space taken by the machine and the workstation
- the volume of space
- space for the human body
- the ease of entrance to the work station
- space for the feet and knees
- space for the hands

Within the control organs the following undergoes evaluation:

- placement in relationship to the operator
- the suitability for the anthropometric and psycho-physiological characteristics of man
- stress on hand and foot-activated controls
- the precision of adjustment
- the static load

The following are evaluated in the means for reflecting information:

- positioning in the operator's field of vision
- logic of mutual links, correspondence to the work algorithm
- positioning relative to controls
- visibility (space organization)
- readability of scales

The production environment is evaluated as an object of verification by using physical and chemical factors.

"During the evaluation of the standard some special characteristics of ergonomic data have to be taken into account. For example, the correct choice of product parameters depends on the type of human activity that it is destined for; the strength needed to push rarely used buttons can be several times higher than that needed to push the same, but frequently used ones. The requirements for the form and numbers on flight instrument scales differ from those for similar instruments, used in different conditions, where the human activity is not under acute time constraints. The second important aspect is the correct calculation of the threshold parameters of the product. For example, the indicator of strength needed to press control levers is chosen with a view to the physically weakest person. To the contrary, the entrance into the control station or a cabin is

chosen with the tallest person in view. When parameters cannot be changed, the seat is usually designed with the person of medium stature in view, which allows it to accomodate the majority of users.

"The efficiency of compliance with the ergonomic requirements set forth in norms and technical documents depends on the quality of developing standards, the practical need for them and the level of ergonomic training of designers. Standards become an important means for solving applied ergonomic tasks when their use is combined with solving the task of substantive modeling of human activities and the environment in which they are performed. Only in this case can the use of standards permit a higher ergonomic level of the products developed."

Table 2

MAIN ASPECTS OF DEVELOPING NORMATIVE AND TECHNICAL DOCUMENTS ON ERGONOMICS

	DEVELOPMENT OF FUNDAMENTAL STANDARDS				
Level 1	SYSTEM OF STANDARD REFERENCE DATA ON HUMAN FACTORS SUBJECTS OF STANDARDIZATION IN ERGONOMICS METHODS OF IDENTIFYING FUNCTIONAL RELATIONSHIPS IN THE "MAN-MACHINE" SYSTEM CLASSIFICATION OF ACTIVITIES IN THE "MAN-MACHINE" SYSTEM MAIN CONSIDERATIONS FOR ERGONOMIC DESIGN AND IMPROVEMENT OF SYSTEMS AND PRODUCTS				
LEVEL 2	CLASSIFICATION AND DEVELOPMENT OF THE LIST OF GENERAL ERGONOMIC NORMS AND REQUIREMENTS			CLASSIFICATION AND DEVELOPMENT OF THE LIST OF QUALITY CHARACTERISTICS	DEVELOPMENT OF THE MAIN GUIDELINES FOR ERGONOMIC QUALITY ASSESSMENT
	FOR THE ORGANIZATION OF OPERATIONS	FOR THE TECHNICAL MEANS OF OPERATIONS	FOR THE CONDITIONS OF THE SYSTEM'S OPERATION		
LEVEL 3	OPERATIONS ALGORITHMS	DESIGN OF THE WORKSTATION	PHYSICAL AND CHEMICAL PSYCHO-PHYSIOLOGICAL CONDITIONS	GROUP CHARACTERISTICS	METHODS OF EVALUATION: EXPERT ASSESSMENT, EXPERIMENTAL, CALCULATION METHODS FOR DETERMINING THE WEIGHT OF THE ERGONOMIC EVALUATION IN THE OVERALL QUALITY EVALUATION
	INFORMATION SUPPORT OF OPERATIONS METHODS OF VOCATIONAL TRAINING SCHEDULES OF WORK AND RECREATION POSITIONING OF WORK STATIONS	SPATIAL ORGANIZATION OF THE WORK STATION STRUCTURE OF THE INFORMATION MODEL ELEMENTS OF THE WORK STATION			
LEVEL 4		ERGONOMIC REQUIREMENTS FOR ELEMENTS OF THE WORK STATION OFFICE EQUIPMENT OPERATOR SEATS MEANS OF DISPLAYING INFORMATION CONTROLS		INDIVIDUAL CHARACTERISTICS	METHODS FOR TRAINING SPECIALISTS IN ERGONOMIC APPRAISALS
LEVEL 5	INCORPORATION OF ERGONOMIC NORMS AND REQUIREMENTS INTO STANDARDS FOR TECHNOLOGICAL REQUIREMENTS, PARAMETERS, ETC.			INCORPORATION OF ERGONOMIC QUALITY CHARACTERISTICS INTO STANDARDS FOR CERTIFIED PRODUCTS (i.e. those receiving the State Mark of Quality)	

from Ergonomika. Printsipy i rekomendatsii, Moscow 1983, p 175.

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